APPENDICES

U.S. Department
of transportation
**Federal Railroad
Administration**

Office of the Administrator

400 Seventh St.. S
Washington. D.C. 20

MEMO TO: All States Participating in the Local Rail Freight Assistance (LRFA) Program

SUBJECT: Standard Benefit-Cost Methodology

The-Local Rail Service Reauthorizing Act of 1989 requires the Federal Railroad Administration (FRA) to establish a methodology for calculating the ratio of benefits to costs of projects proposed for LRFA funding no later than July 1, 1990. Attached is the methodology.

In developing this methodology, we have taken into consideration the twenty state methodologies previously approved by FRA as well as the comments we received from eighteen states in response to the draft methodology is distributed on May 15, 1990. Each state that submitted comments will receive a letter addressing the comments provided.

The statutory directive that a standard methodology be established is based on two other statutory requirements. First, the Local Rail Service Reauthorizing Act of 1989 limits eligibility to only those projects where the ratio of benefits to costs is greater than one. Second, FRA is required to consider the ratio of benefits to costs of projects proposed for discretionary funding. Equitable implementation of these provisions requires the use of a standard methodology.

Should you have any questions regarding the methodology, please contact the office of Passenger and Freight Services at 202/366-1677.

Gilbert E. Carmichael
Federal Railroad Administrator

BENEFIT-COST METHODOLOGY

FOR

THE LOCAL RAIL FREIGHT ASSISTANCE PROGRAM

Required by the
Local Rail Service
Reauthorizing Act
(PL 101-213: 12/11/89)

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TABLE OF CONTENTS

BENEFIT-COST METHODOLOGY
FOR PROJECTS UNDER THE LOCAL RAIL
FREIGHT ASSISTANCE PROGRAM

BACKGROUND AND INTRODUCTION

The local Rail Service Reauthorizing Act of 1989 amended Section 5 (n) of the Department of Transportation Act (Act), to require that:

> "The Secretary, no later than July 1, 1990, shall establish a methodology for calculating the ratio of benefits to costs of projects proposed under subsection (b), taking into consideration the need for equitable treatment of different regions of the United States and different commodities transported by rail. The establishment of such methodology shall be a matter committed to the Secretary's discretion."

Section (c) (2) of the Act was also amended as follows:

> "No projects shall be provided rail freight assistance under this section unless the ratio of benefits to costs for such project, calculated in accordance with the methodology established by the Secretary under subsection (n), is greater than 1.0."

This methodology has been established and published in response to the Act's directive. It is to be used for calculating the benefit-cost ratios of all projects for which assistance is requested under Section (b) of the Act. These projects include acquisition of a line of railroad or other rail property, rehabilitation or improvement of rail properties and construction of rail or rail related facilities.

The foundation for much of this methodology was provided by two earlier FRA documents: Benefit-Cost Guidelines Rail Branch line Continuation Program (February 1980) and FRA Simplified Benefit-Cost Methodology (May 1982). Also, the twenty State methodologies that have been approved by the FRA were each review, both to identify common elements and to identify individual State approaches to issues that might have been overlooked in the earlier FRA documents.

An example of the result of this review process is the inclusion in this methodology of the avoidance of increased highway maintenance costs as a legitimate secondary benefit of a rehabilitation project that prevents rail line abandonment. Neither of the earlier FRA documents addressed this issues although 35 percent of the States submitting methodologies did. Most of the potential projects in these States were on branch lines in rural/farm areas where it could be expected that significant diversion of traffic onto farm to market secondary roads would indeed create the need for increased maintenance on those roads.

Inclusion in the methodology of this feature also complies directly with the Act’s requirement that the Secretary take into consideration “…the need for equitable treatment of different regions of the United States and different commodities transported by rail.”

THE BENEFIT-COST METHODOLOGY

General. The following sections present, in a step by step fashion, the benefit-cost methodology to be used for analyzing local rail freight assistance projects. The methodology and the steps included herein have been developed as the minimum with which the analyst must comply if the benefit-cost analysis is to meet the statutory requirements discussed earlier.

The analyst or other reader who is interested in learning more about the economic theory behind benefit-cost analyses in the local rail service area and/or the various techniques available for gathering and analyzing information is referred to the FRA's February 1980 Benefit-Cost Guidelines rail Branch Line Continuation Program, and to the FRA's July 1978 Rail Planning Manual, Volume II: Chapter 2, "Light Density Lines".

It is important that the data underlying the benefit-cost analysis be reasonably current and data over three years old should not be considered valid, except where:

1. It is part of a historical time series of data that has an end date within three years prior to submissions of the data, or:
2. An explanation accompanies submission of the data as to why it can reasonably be expected to reflect current conditions.

A benefit-cost analysis of a candidate rail freight assistance project must complete the following steps:

1. Establishing the project alternative;
2. Determining the project costs;
3. Determining the null alternative;
4. Using the standard planning horizon;
5. Using the FRA published discount rate;
6. Calculating transportation efficiency benefits;
7. Calculating secondary benefits;
8. Calculating salvage value;
9. Calculating the benefit-cost ratio.

Each of these steps is discussed in detail in the sections which follow.

Establishing the project alternative. The analyst must begin by identifying the problem, determining the possible solutions to the problem, comparing those solutions to each other and choosing which one (or more) to define as a "project" for purposes of performing the benefit-cost analysis or analyses. The project must meet one of the statutory eligibility criteria which are (1) acquisition of a line of railroad or other rail property, (2) rehabilitation or improvement of rail properties, or (2) construction of rail or rail-related facilities.

Table 1 presents in a summary fashion, for each of the eligible project alternatives, the type of indications that would lead the analyst, to choose that alternative for evaluation. It also presents categories of benefits and costs to be used in comparing various project alternatives with various null alternatives.

Determining the project costs. In most cases, the project cost will be equal to the cash and in-kind outlays used to build and implement the project, exclusive of financing costs. Since the analysis is from a public perspective, the source of funds or the financing arrangements have no bearing on the project cost. It is important to include the costs covered by shares paid in cash or in kind by the Federal Government, the State, the railroad, local governments, shippers (for the purpose of this methodology shippers also includes receivers), or anyone else contributing to the project. If costs will occur in future years, such costs should be discounted to a present value.

In some cases, there will be more to the project than just the direct cash and in-kind investments. For example, when the project alternative is rehabilitation and the null alternative is abandonment, the project cost should include the net liquidation value of the existing line. This is because the materials and land tied up by the line could be released for other purposes if the project were not undertaken. Similarly, any project which uses existing resources that under the null alternative would be sold must include the value of those resources as part of the project cost. Conversely, when the project alternative is rehabilitation and the null alternative is continued operation on poor track, then the value of any material taken up during the rehabilitation and used elsewhere (e.g., light rail which is used on other lines in the railroad's system) should be subtracted from the cost of the rehabilitation project.

Determining the null alternative. Although seeming to be self evident, this step is as important as any in the process. The null alternative represents the analyst's best estimate as to what will happen if the project is not undertaken, and is the alternative against which any candidate project must be compared in the benefit-cost analysis. Possible null alternatives to various types of projects are shown in Table 1.

Chapter 2 of the Rail Planning Manual provides considerable information on data collection techniques and methods to assist the analyst in determining the null alternative.

Using the standard planning horizon. This is the number of years over which the benefits and costs of the project will be considered. The FRA has determined that for local rail freight assistance projects the appropriate planning horizon is ten years, and that horizon is to be used in all benefit-cost analyses in support of project applications.

Using the FRA published discount rate. The discount rate to be used each year in benefit-cost analyses will be published annually by the FRA after funds for the Local Rail Freight Assistance Program have been appropriated. Normally, that will be at the same time as the FRA sends to the States the solicitation for applications for projects to be funded with that year's appropriation.

The published discount rate will be based upon the Federal Government's cost of borrowing (determined by the interest rate on 10 year obligations) less that element of the cost of borrowing that is estimated to represent expectations as to inflation.

Because the discount rate to be used will not include an inflation component, all forecasts of cost and benefits included in the analysis are to be in constant dollars.

Calculating transportation efficiency benefits. Transportation efficiency benefits are those which are a direct effect of the project alternative being considered. Much of the information used to calculate transportation efficiency benefits must, of necessity, be provided by railroads and/or shippers. To the extent permissible under law, any information considered commercially sensitive will be protected. Any information submitted with or as part of a benefit-cost analysis which the State wants to be treated confidentially should be clearly and specifically so identified.

Refer back to Table 1 for examples of the types of transportation efficiency benefits to be achieved under various combinations of project and null alternatives. Because the alternatives and the circumstances attendant to the alternatives will vary in each case, so will the procedures used to calculate the transportation efficiency benefits. Various procedures and formulas are presented in the Benefit-Cost Guidelines for Local Rail Service Assistance. The procedures described here for the two most common sets of alternatives will allow for estimation of these benefits using readily available data. The two sets of alternatives discussed here are:

(1) The null alternative is abandonment and the project alternative is rehabilitation.

(2) The null alternative is continued operation and the project alternative is rehabilitation.

In the majority of other eligible project alternatives, the procedures discussed here will still be relevant if the words "acquisition" or "construction" are substituted for "rehabilitation" in the following discussion.

In describing the calculation of benefits, the terms "base traffic" and "incremental traffic" will be used often. Base traffic is the amount of traffic that would be shipped under both alternatives, by whatever mode. Incremental traffic is the amount of traffic that would be shipped under the project alternative, but not under the null alternative. For example, incremental traffic includes new traffic that the shipper chooses to produce and ship under the project alternative, but which would neither be produced nor shipped under the null alternative. Incremental traffic may also simply consist of traffic saved from extinction by preventing an abandonment that would put a shipper out of business. In many cases, incremental traffic will be zero.

The calculation for determining the transportation efficiency benefits of the first set of alternatives (rehabilitation vs. abandonment) is as follows:

Transportation efficiency benefits = resulting from implementing the project alternative	Reduced transportation cost to the shipper on base traffic plus Profits earned by the shipper in producing, shipping and selling incremental traffic plus (minus) Branchline operating profits (losses)

Table 2 presents a worksheet format for calculating transportation efficiency benefits for this set of alternatives. As an example of the calculation in a simple case, assume that under the project alternative (a rehabilitated branch line), the only business on the line will manufacture and ship 3,000 tons by rail at a rate of $5.00 per ton; that under the null alternative (abandonment), the shipper will only manufacture and ship by truck 1,000 tons at a rate of $10.00 per ton; that in manufacturing, shipping and selling the additional 2,000 tons under the project alternative, the shipper, earns an additional profit of $5,000; and that under the project alternative railroad on- and off-branch operating costs exceed attributable revenues by $4,000. Then,

Reduced transportation costs = to shipper on base traffic	(1,000 tons) x ($10.00 - $5.00) = $5,000
Profits earned by the shipper = on incremental traffic	$5,000
Branchline operating losses =	$4,000
Net transportation efficiency = benefits	$5,000 + $5,000 - $4,000 = $6,000

The example presented above is purposefully a simple one, and real world variations will undoubtedly present the analyst with complications. A more complex example is presented in the Appendix. Additionally, some of the differing circumstances that may arise are discussed below.

(1) The line may have more than one business and/or commodity using its services. If so, the reduced transportation costs to the shipper on base traffic and the profits earned by the shipper on incremental traffic would have to be computed separately for each commodity and business and then summed.

(2) Forecasted continued operation of the line at a deficit may result in surcharges. Such surcharges should be included in the rate paid under the project alternative.

(3) The approach presented here requires the analyst to establish the on- and off-branch operating costs and attributable revenue for the branch line. The Interstate Commerce Commission abandonment procedures, 49 CFR 1152, Subpart D (Standards for Determining Costs, Revenues and Return on Value), provide a methodology for calculating on- and off-branch operating costs as well as attributable revenue. If appropriate data are not readily available from the railroad(s), the analyst will need to study the line operation and develop data using appropriate unit costs.

(4) This approach assumes that the rate charged by an alternate mode is equal to its cost to provide service (including a return on investment). That assumption is necessitated by the fact that little or no information is normally available to allow the analyst to calculate alternate mode costs with any reasonable accuracy. If information is available to show that the alternate mode's rate is different than its cost to provide services, appropriate adjustments should be made (as were made by considering the operating income or loss attributable to the branchline).

(5) In the above example, a simple assumption is made about the profits earned by the shipper on incremental traffic. In reality, that information may not be easily obtained and will require cooperative dialogue with the shipper(s) or potential shipper(s) involved, as well as some independent confirming evaluation by the analyst. However, since it

is in the shipper's self interest to have lower transportation rates, and thus higher profits, he should be motivated to cooperate.

In the second set of most commonly seen alternatives (rehabilitation versus continued operation), calculating the benefits involves estimating decreases in rail line operating costs for current traffic and estimating benefits of any newly generated traffic. If tariffs will remain the same under both alternatives, the benefits will normally be simply increased operating income for the branch line as a result of decreased operating costs. Table 3 provides a worksheet format for calculating and recording transportation efficiency benefits under this scenario. Occasionally, improved service as a result of rehabilitation may attract incremental traffic to a line even if there is no tariff decrease. In those cases, the increased profit to the shipper(s) of producing, shipping and selling that incremental traffic should be included. However, the analyst should verify that the shipper(s) commitment to provide the incremental traffic is real and will not vanish after the rehabilitation is finished.

If the operating cost savings resulting from the rehabilitation translate into lower tariffs as well as (or perhaps instead of) increased branch line operating income, or if the rehabilitation keeps tariffs from rising, then there will be shipper related benefits and the situation will be similar to the rehabilitation versus abandonment set of alternatives and should be handled according to the worksheet format shown in Table 4. It is important that the analyst track closely the savings in this case, from operating cost savings to either increased branch line profits or rate reductions, and thus benefits to the shipper(s), so as to avoid double counting of benefits.

Calculating Secondary Benefits. Secondary benefits are those which are an indirect consequence of the project alternative being evaluated and normally reflect temporary dislocations that will be avoided by implementing the project alternative rather than allowing the null alternative to occur. The analyst should identify secondary benefits and quantify them for each year in the planning horizon, including all offsets, taking care to avoid double counting and the inclusion of transfer payments. If in the course of searching for and identifying secondary benefits, the analyst determines that they do not warrant consideration, then they need not be quantified and included in the analysis. However, a statement to that effect should be included.

In calculating secondary benefits, the analyst should take a Statewide and not a local perspective. Thus, for example, if a plant is expected to close as a result of a rail line abandonment, it is important to know what alternatives the plant's owner might pursue, if any. If the owner intends to relocate that plant's production to another part of the State, then the local employment and other impacts should not be included in the analysis, since they will be offset at the new location. If the owner intends to relocate out of State, then these impacts should be included. This pertains also to any tax revenues lost to the State or local community as a result of the plants relocating out-of-state. In either case, the business relocation costs should be included in the analysis.

Typical secondary benefits to be addressed include:

(l) Relocation Expenses. If rehabilitation of a line prevents abandonment of that line and a shipper thus avoids moving his business elsewhere, the relocation costs saved are secondary benefits of the rehabilitation alternative. Information and data to quantify these benefits must be obtained through cooperative dialogue (or surveys) with the shipper(s) involved, and independent confirming evaluation by the analyst. Typical relocation expenses might include (but are not limited to) the cost of moving equipment and inventory, the cost of moving key employees and the cost of breaking a lease at the old location. In addition to relocation, shippers might have other alternatives, including changing markets. If so the avoidance of the costs of turning to those alternatives should be quantified as benefits.

(2) Unemployment. If the abandonment alternative would result in people losing their jobs, then the value of the wages earned by those people under the rehabilitation alternative constitutes a secondary benefit, but only for the length of time that they would have been unemployed under the abandonment alternative. The analyst must establish that period, beginning with data available from the State unemployment office as to unemployment rates and the length of time that people in the

local area (usually on a county basis) pursue unemployment claims. Care must be taken to keep the unemployment analysis reasonable. Inclusion of jobs lost beyond the shipper, railroad and secondary jobs that can be specifically identified as resulting from the abandonment should be avoided.

Because the benefit-cost analysis is to be conducted from a State wide perspective, unemployment compensation should not be deducted from the lost wages, since within the boundaries of the State, unemployment compensation is a transfer payment. Additionally, the analyst should take into account as an offset the value of any jobs created by the abandonment alternative (e.g. trucking industry jobs if there is a significant movement to that mode). On the other hand, the value of new jobs created by the project alternative is an additional benefit if people who would otherwise remain unemployed fill those jobs.

(3) Highway Impacts. At some point, diversion of traffic from rail to truck may become significant enough to result in increased maintenance needs on the local road and highway system. Another highway related impact to be considered is increased air pollution. While increased highway maintenance costs and air quality impact may be difficult to quantify, they are legitimate secondary benefits.

It should not be forgotten that traffic diversion significant enough to increase road and highway maintenance costs also implies offsets to the benefits achieved by avoiding that maintenance. Offsets to be taken into account at the appropriate steps in the analysis include any increased trucking industry employment (discussed earlier) and increased road and use tax revenues, such as fuel taxes and vehicle registration fees.

Calculating salvage value. The salvage value for the last year in the planning horizon should be calculated. In cases where the value of the entire line was used in the project cost, the salvage value of all materials in the line, i.e. the line's net liquidation value, would be used here. If the project cost represents only those capital improvements put in place by the project, it is the C salvage value of only those capital improvements that would be used here.

Calculating the benefit-cost ratio. Using the FRA published discount rate, calculate the present value of the benefits (see Table 5 for an example format). The sum of the present values of the benefits should then be divided by the project cost to determine the benefit-cost ratio. In the case of a phased project, the present value of future project costs should be added to current year costs.

Table 1

Alternatives for Benefit-Cost Analysis

Project Alternative	Null Alternative	Indications & Comments	Benefits Categories	Cost Categories
I. Rehabilition & continued operation	A. Abandonment	The line is in Category 1, 2 or 3 of a system diagram map; the railroad has stated publicly that with rehabilitation the line will be retained; financial analysis shows that the line is unprofitable but that rehabilitation will make it profitable.	(I) Difference between rates charged for service by alternate mode and rates charged for rail service on traffic that will move under both alternatives. (II) Shipper business profits, on traffic that would not move without rehabilitation. (III) Branch line projected operating profit. If a loss is projected, this amount is negative. (Iv) Labor output that would be lost without rehabilitation. (v) Cost of moving businesses, if move would opccur with abandonment. (vI) Increased cost of maintaining/repairing roads if modal-shift occurs with abanment. (vII) Salvage value of entire line at end of planning horizon.	(I) Cost of rehabilitation materials and labor including the present value of any future rehabilitation required to keep the line operating. (II) Net liquidation value of line prior to rehabilitation

Table 1 (continued)

Alternatives for Benefit-Cost Analysis

Project Alternative	Null Alternative	Indications & Comments	Benefits Categories	Cost Categories
	B. Continued operation on poor track	The line is in Category 5 of a system diagram map; the branch line accounts show the line to be marginally profitable.	(I) Increase in branch line profits after rehabilitation. (II) Any decrease in rates on traffic moving under both alternatives. (III) Shipper business profits on traffic that would not move without rehabilitation. (Iv) Salvage value of rehabilitation materials at end of planning horizon.	(I) Cost of rehabilitation materials & labor. (II) As a cost offset the value of any materials released which are sold or used elsewhere.
2. Rehabilitation and Resumption of Service	Non-resumption of Service	Line has been out of service. Changes in local economic conditions indicate a demand for resumed service.	Same as 1A (I,II,III,Iv, and vII)	Same As 1A

Table 1 (continued)

Alternatives for Benefit-Cost Analysis

Project Alternative	Null Alternative	Indications & Comments	Benefits Categories	Cost Categories
3. Acquisition with continued operation	A. Abandonment	This is the expected null alternative, since there is usually no reason to acquire if the railroad will serve the line anyway.	Same as 1A	(I) Cost of acquiring the line. Including the present value of any future rehabilitation required to keep the line operating.
	B. Continued operation	This may occur if the line is currently owned by one party and leased by another	(I) Present value of stream of lease payments.	(I) Cost of acquiring the line. Including the present value of any future rehabilitation required to keep the line operating.
4. New construction	A. Transportation service continues as is	Transportation services currently provided are profitable.	Same as 1B.	(I) Cost of materials and labor for the capital improvement. (II) Present value of any future rehabilitation required to keep line operating or reopen it.
	B. Transportation service is changed (e.g. line is abandoned)	Some transportation services currently provided are unprofitable	Same as 1A (I), (v)	(I) Cost of materials and labor for the capital improvement. (II) Present value of any future rehabilitation required. Same As 1A

Table 2

Calculation Sheet for Transportation Efficiency Benefits
Null Alternative = Abandonment
Project Alternative = Rehabilitation

Item	Amount Per Year
1. Reduced transportation cost to the shipper on base traffic as a result of the rehabilitation.	
2. Shipper's profit on incremental traffic (traffic that would not move without the rehabilitation)	
3. Branch line projected operating profit (loss) after the rehabilitation	
4. NET TRANSPORTATION EFFICIENCY BENEFITS (add lines 1, 2, and 3)	

NOTES:

1. Reduced transportation cost on base traffic = Quantity shipped in null D alternative x (rate per unit in null alternative minus rate per unit in project alternative).
2. Shipper's profit on incremental traffic should be determined by cooperative dialogue with the shipper and evaluated for reasonability by the analyst.
3. Branch line projected operating profit (loss) = Branch line projected attributable revenue minus projected off-branch costs minus projected on-branch costs (excluding return on value).

Table 3

Calculation Sheet for Transportation Efficiency Benefit.
Null Alternative = Continued Operation
Project Alternative = Rehabilitation
Note: No change in rates between project and null alternatives

Item	Amount Per Year
1. Branch line operating profit after rehabilitation	
2. Branch line operating profit before rehabilitation	
3. NET TRANSPORTATION EFFICIENCY BENEFITS (subtract line 2 from line 1)	

NOTES:

(1) Branch line operating profit = Branch line attributable revenues minus off-branch costs minus on-branch costs (including return on value).

(2) Where the effects of rehabilitation are directly traceable to changes in specific cost elements (e.g. crew costs), it is adequate to simply calculate the value of each of those changed costs and sum them to arrive at the total transportation efficiency benefits, without having to calculate total branch line operating profit before and after rehabilitation.

Table 4

Calculation Sheet for Transportation Efficiency Benefits
Null Alternative = Continued Operation
Project Alternative = Rehabilitation
Note: Rates are Reduced Under Project Alternative
(or are kept from rising

Item	Amount Per Year
1. Reduced transportation cost to the shipper on base traffic as a result of the rehabilitation	
2. Shipper's profit on incremental traffic (traffic that would not move without the rehabilitation)	
3. Increase in branch line projected operating profit as a result of the rehabilitation	
4. NET TRANSPORTATION EFFICIENCY BENEFITS (add lines 1, 2, and 3)	

Table 5

Calculation of the Present Value of Project Benefits

Benefit Category	Year (a) 1	2	3...........	10
1. Transportation Efficiency Benefits				
2. Lost Labor Output	(b)	(c)	(c)	(c)
3. Business Moving Costs	(b)	(c)	(c)	(c)
4. Increased Highway costs				
5. Salvage Value				
6. Totals				
7. Discount Factor (d)	$(1+i)$	$(1+i)^2$	$(1+i)^3$	$(1+i)^{10}$
8. Present Value of Totals (6 divided by 7)				

(a) Each year from 1 to 10 should have its own column.

(b) If abandonment occurs in a later year, this benefit would be moved to that year.

(c) No entry should be made beyond the temporary period in which people would be employed and/or the business is moved.

(d) The interest rate (discount rate) is represented by the letter i. Calculations to determine the discount factor can be eliminated by using discount Tables available in many economics and finance textbooks or by the use of a pocket calculator which includes a discounting function.

APPENDIX

AN EXAMPLE OF THE METHODOLOGY'S APPLICATION

The following example indicates how the benefit-cost methodology would be applied to a specific project.

Establishing the project alternative. In this particular case, the project contemplated is rehabilitation of a 45-mile rail branch line. The branch line is in poor condition, and an application for abandonment has been filed.

To determine whether the line can reasonably be expected to continue operating after rehabilitation, a forecast of revenues and expenses is generated (shown in Table A-1). Although the line's a operating profit will be positive, it is not sufficient to provide an adequate return for the railroad for the $610,000 it could receive by scrapping the line. Nevertheless, the railroad has consented to withdraw its abandonment application if the line is rehabilitated. Therefore, the project alternative is rehabilitation and continued operation.

Determining the project costs. The project will be phased, with the first half of the rehabilitation to occur in year zero (the current year) at a cost of $200,000 and the remaining work to occur in year one at a cost of $250,000. The year one cost has a present value of $235,850, which is $250,000 divided by 1.06 (achieved through application of the discount rate discussed subsequently). This brings the present value of the cost of all rehabilitation work to $435,850. These costs include the cost of ties, ballast, labor, and some rail replacement. Since the line will be abandoned without, the project, the project cost must include the net liquidation value of the line, which in this case, is $610,000 (see Table A-1). The total project costs, then, are $1,045,850.

Determining the null alternative. All indications lead to the conclusion that failure to rehabilitate the line will lead to | immediate abandonment, with shippers either finding other modes to ship their goods, reducing output, closing or moving.

Using the standard planning horizon. The FRA-prescribed ten-year planning horizon is used.

Using the FRA published discount rate. For the purposes of this C example analysis, it is assumed that the real discount rate published by the FRA is six percent. Consistent with the methodology, constant dollars will be used throughout the analysis.

Determining the transportation efficiency benefits. To determine the transportation efficiency benefits, it is necessary to forecast commodity shipments and their prices under both the project and null alternatives. Table A-2 contains such a forecast. As columns 2 and 3 of the table show, the shipments of commodity types 20 and 28 (food and chemicals) will remain the same under either alternative. The shipments of commodity types 24 and 26 (lumber and pulp) will decline substantially if the branch line is abandoned. Columns 4 and 5 of the table show the forecasted unit price per carload for each commodity. Columns 6 and 7 of the table show the total carrier charges that would be paid by the shippers A-3 under each alternative. Note that the total carrier charge for commodity 26 (pulp) declines not because of a lower price but because of the large decrease in the amount shipped. Column 8I shows annual price differences on base traffic. This is found for each commodity by multiplying the number of carloads of base traffic by the difference in transportation price per carload under each alternative. The base traffic is the smaller of the figures in columns 2 and 3. For example, the base traffic price difference for commodity 24 is 2,000 carloads X ($260 per carload-$160 per carload), or $200,000. Column 9 is the shipper's profit on making, shipping and selling incremental traffic. This data would be obtained from conversations with the shippers and independent evaluation of data provided by them. Incremental traffic is the column 2 figure minus the column 3 figure. The sum of column 8, the sum of column 9, and the operating profit on the line (shown on Table A-1) represent the total annual transportation efficiency benefits of rehabilitating and retaining the branch line. These figures are shown and totaled on Table A-3.

Calculating secondary efficiency benefits. Since no businesses would move under the abandonment option, no business relocation costs are involved. However, some temporary unemployment will result. Information provided by the railroad and the shippers, supplemented by field research in the local communities, leads to the estimate that the abandonment and reduction of shipper output will lead to the temporary loss of 30 jobs. State unemployment A-4 data shows that the average unemployed person will find a new job in about six weeks and that the average weekly pay is $200. Thus, the total value of lost labor output is $36,000.

Calculating salvage value for the last year in the planning horizon. In this case the cost of the project included the rehabilitation work and the net liquidation value of the entire |line. It is estimated that in ten years the salvage value will be approximately $700,000.

Calculating the benefit-cost ratio. The benefit-cost ratio calculation is shown on Table A-4. Benefits for each year are shown separately and summed, and each year's sum is discounted to present value. The total present value of the benefits is then divided by the project cost to yield a benefit-cost ratio of 2.8, showing the project to be worthwhile from an economic efficiency viewpoint.

Table A-2

Commodity Shipment and Tariff Forecasts
(Annual Data)

STCC Code	Ammount Shipped (Carloads)		Transportation Price Per Carload ($ per carload)		Annual Transportation Charges ($ per year)		Base Traffic Price Difference ($ per year)	Shippers Profit on Incremental Traffic ($ per year)
	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2		
20	125	125	210	270	26,250	33,750	7,500	-0-
24	3000	2000	160	260	480,000	52,000	200,000	50,000
26	200	80	133.75	250	26,750	20,000	9,300	6,975
28	450	450	260	300	117,000	135,000	18,000	-0-
Totals							234,800	56,975

Note: Alt. 1 is rehabilitation
Alt. 2 is abandonment

TABLE A-3

Calculation of Annual Efficiency Benefits from

Implementing Rehabilitation Alternative

Type of Benefit	Amount Per Year
1. Reduced transportation cost to the shipper on base traffic	$234,800
2. Shipper profit on incremental traffic	56,975
3. Branch line projected operating profit (loss) after the rehabilitation	49,000
NET ANNUAL TRANSPORTATION EFFICIENCY BENEFITS	**$340,775**

Table A-4

Calculation of the Present Value of Rehabilitation Project Benefits

	YEAR									
Benefits Category	1	2	3	4	5	6	7	8	9	10
1. Transportation Efficiency Benefits	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775
2. Lost Labor Output	36,000	--	--	--	--	--	--	--	--	--
3. Salvage Value-end of Period	--	--	--	--	--	--	--	--	--	$700,000
4. Total Benefits (constant $)	$376,775	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$1,040,775
5. Discount Factor (at 6%)	1.06	1.124	1.191	1.262	1.338	1.418	1.503	1.593	1.689	1.79
6. Present Value (4 divided by 5)	$355,448	$303,181	$286,125	$270,028	$254,690	$240,321	$226,730	$213,920	$201,761	$581,438

7. SUM OF PRESENT VALUES OF BENEFITS = $2,933,642

8. PRESENT VALUE OF COSTS = $1,045,850 = $1,045,850

9. BENEFIT-COST RATIO (7 - 8) = 2.8 = 2.8